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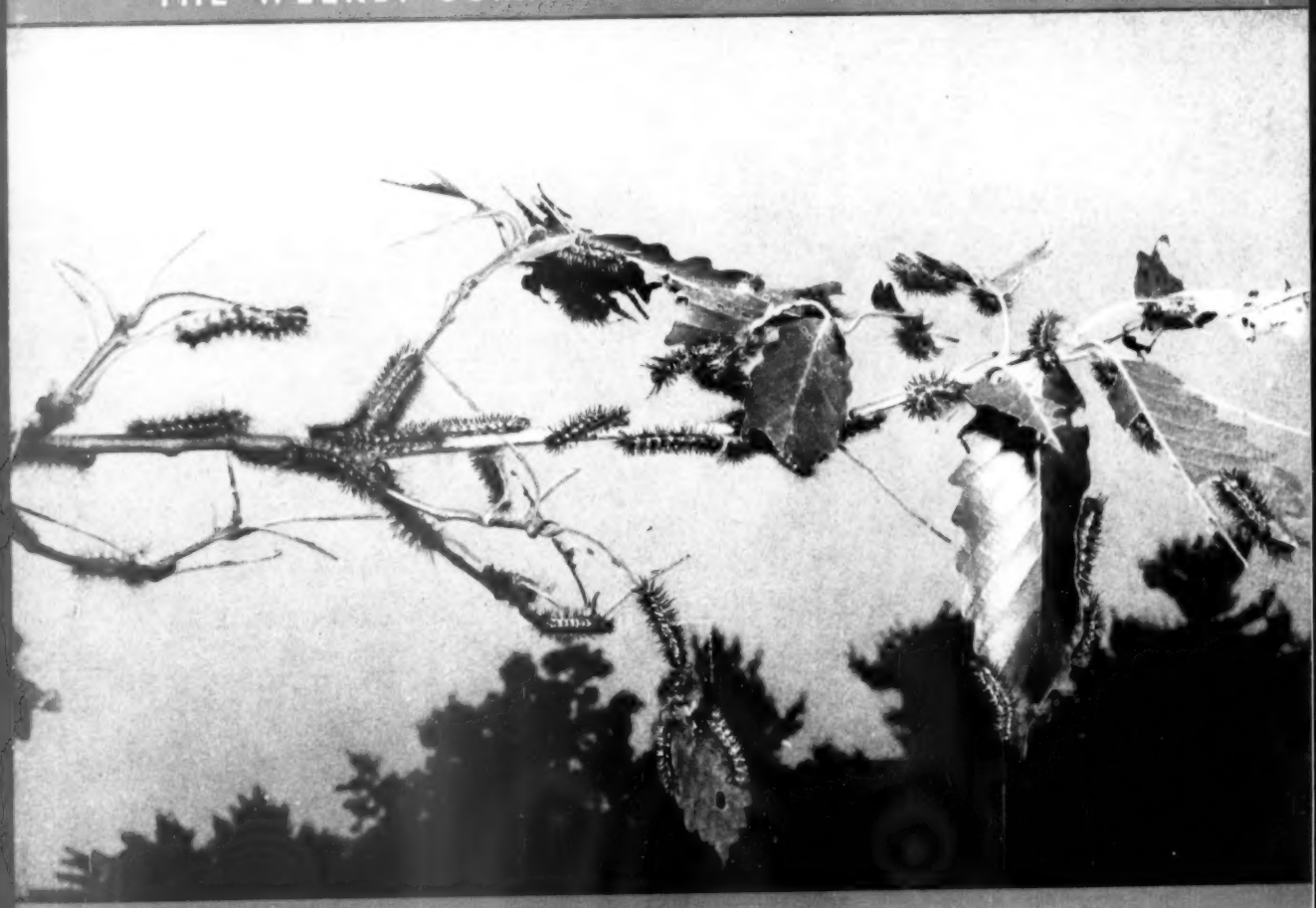
THE WEEKLY SUMMARY OF CURRENT SCIENCE



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MEDICINE

Check Cancer of Bladder

Scientists studying the cause, treatment and prevention of cancers have made many advances, some of which were reported at an International Cancer Congress in London.

By ANN EWING
From London

➤ A SUCCESSFUL check against recurring bladder cancers has been found.

The check consists of oral lactone feeding, Prof. E. Boyland of London's Chester Beatty Research Institute told the International Cancer Congress in London. (See pp. 36, 38, 47.)

The method is presently applicable only to those persons whose bladder cancer was caused by aromatic amines, and then only after the first cancer has been detected. Researchers are now studying methods of preventing bladder cancers before they actually occur in those industrial workers that are exposed to aromatic amines, the London scientist said.

There have been no recurrences of bladder cancer among those treated with the lactone. Prof. Boyland did caution, however, that the work is only two years old and that recurrences often occur in the upcoming crucial period, the two-through-five-year period.

Speculation points to the use of the lactone treatment for bladder cancer of the general population. Bladder cancers comprise only two percent of the total number of carcinomas. This particular type of cancer, however, is extremely agonizing for the patient.

Prior to the Second World War, the successful arrest rate for bladder cancer was only six percent. Since then, the treatment by radioactive pellet has increased the survival probability to five years for 45% of the victims.

Lactone is 1-4 gruosaccharolactone. It inhibits the formation of betaglucuronidase in the bladder. Most men with bladder cancer excrete more of the betaglucuronidase and 3-hydroxyanthranilic acid than do normal persons. These are products of amino acid metabolism and produce carcinogens within the bladder itself.

It has long been known that aniline dyes cause bladder cancers. Many manufacturers discontinued the production of the most dangerous dyes or else resorted to extra precautions.

Other treatments for bladder cancer include surgical reconstruction of a new bladder from intestines or very high voltage radiation of between 2,000,000 and 20,000,000 volts.

"EYE" FOR ASTRONOMERS—A new electronic "eye" that can see at extremely low light levels is shown with its developers, Dr. George A. Morton, left, and Dr. John E. Ruedy, at the Radio Corporation of America's Princeton, N. J., research center. The camera tube is described as having 100 times the sensitivity of the fastest known photographic film at the same exposure time. Astronomers may be able to observe previously unseen details of planets and nebulae.

Cancer Research Animal

➤ THE RUSSIANS reported a "convenient and interesting" new animal suitable for cancer research.

The animal is the steppe-lemming, a wild Russian rodent. It can be successfully bred in glass mouse jars with sawdust and hay in the bottom.

The reproduction rate and fertility of the Russian rodent is lower than that of the mouse. However, it is susceptible to the carcinogenic action of the cancer-producing chemical, DMBA. Skin tumors appeared in all the animals that survived for four or more months after the start of the experiments, and sarcomas appeared in from 50% to 85% of the animals.

Feeding the steppe-lemmings a DMBA oil solution failed to produce gastric tumors, however, unlike mice which under the same circumstances develop cancer.

Induced sarcomas have been successfully transplanted in as many as 13 generations of the rodents to date but attempts at permanent transplantation with the animals have failed. Inbreeding is continuing, Dr. H. E. Pogosianz of the Academy of Medical Sciences in Moscow told the Congress.

The development of multiple spontaneous mammary cancer in one of the female animals indicates that the steppe-lemming is suitable, too, for the study of this cancer.

Other Soviet researchers who assisted in this work are N. I. Bolonina and L. V. Olshevaskaja.

(It is believed that this particular rodent closely resembles or is the Lagurus lemming, a small, soft furred, gray-brown, short-tailed, mouse-like animal. The rodent is closely related to a rare lemming that inhabits the northwestern United States.

The steppe-lemming dwells on the level, vast treeless tracts of southeastern Europe and west central Asia.)

Cancer-Smoking Dispute

➤ A SIGNIFICANTLY higher death rate among regular tobacco smokers than among nonsmokers has been found in a U. S. Public Health Survey of nearly 200,000 veterans.

Dr. Harold F. Dorn, chief statistician for the National Institutes of Health, Bethesda, Md., reported to the Congress:

1. Death rate from all causes of persons using tobacco was 16 per thousand compared with 13.1 for nonsmokers.

2. Cigarette smokers had the highest death rate of all smokers.

3. The lung cancer rate for regular cigarette smokers was about ten times the nonsmokers' death rate.

4. Diseases of the heart, blood vessels and kidney accounted for nearly two-thirds of the tobacco users' deaths. Greater death rates from certain respiratory diseases such as bronchitis, pleurisy and emphysema, ulcers of the stomach and duodenum, and from cirrhosis of the liver were also reported.

MEDICINE

Oxygen Affects Cancer

Experiments with mice have shown that oxygen starvation affects cancer cells adversely, while the animal's body as a whole seems to be able to adjust to lowered oxygen amounts.

➤ SUFFOCATION of tumor cells by means of lowered oxygen supplies in patients' rooms may become a possible cancer treatment, it was foreseen.

Mice experiments have shown that some types of tumors can be inhibited by oxygen starvation of cancer cells after the animals' bodies become accustomed to the low oxygen supply, Dr. Samuel Graff told a group attending the International Cancer Congress in London. (See pp. 35, 38, 47.)

Dr. Graff's theory proposes that cancer cells are unable to adjust, as do the normal cells, to reduced oxygen supplies, that simply stop the normal growth process. Since oxygen is essential for growth, he said, cancer cells must grow or die.

Normal cells can adjust to a reduced supply of oxygen, maintaining themselves, but not growing. Cancer cells, under these same conditions, cannot grow, so they die, he explained.

Dr. Graff's one terminal patient showed that a sick person can become accustomed to lowered oxygen supplies. An average reduction of one-half the normal oxygen equivalent, or the amount of oxygen found at 21,000 feet, is the necessary effective amount, he said.

In addition, he reported, the tolerance for low levels of oxygen increases with the increased size of species. Therefore, presumably, humans could tolerate lower oxygen levels than the experimental mice. Still to be determined is the exact length of time humans might remain acclimated to a reduced oxygen supply without ill effects and how long it would take to kill cancer cells. Associated with Dr. Graff are A. Barach, H. A. Bickerman, J. G. Beck and M. Eisenberg.

New chemical knowledge concerning the nature of cancer and normal cell differences was also introduced by Dr. M. Earl Balis of the Sloan-Kettering Institute in New York.

The difference involves the cell's incorporation of guanine, an essential component of growth and heredity controlling chromosomes.

Contrary to former thinking, he said, guanine, when present in large quantities, is absorbed in greater quantity by cancer cells than normal tissue. Therefore, if the deadly chemical can be altered, it could be used to interfere with cancer cell function and retard or stop the disease process without causing undue harm to the normal cells.

Science News Letter, July 19, 1958

PHYSICS

Russians Test Accelerator

First results of research conducted with the world's largest atom-smasher, a ten billion electron volt accelerator built by Russian scientists, have been reported.

➤ RUSSIAN SCIENTISTS reported the first results of experiments with their atom-smasher, the world's largest, to the 1958 Annual International Conference on High Energy Physics in Geneva, Switzerland. (See p. 37.)

Their studies showed the hard core of a proton, a fundamental particle of the atomic nucleus and a building block for all matter, shrinks at high energies. Using their atomic accelerator at close to its full power of ten billion electron volts, they bombarded a target of protons with a beam of protons.

The hard, central part of the nucleus when smashed with particles at energies of nine billion electron volts is only eight-tenths of a barn, compared to 2.7 barns at the low energy of 100,000,000 electron volts. A barn is the unit used by physicists to measure the area over which atomic nuclei react. It is equal to about 40 million-billion-billionths of an inch.

None of the Russians in the 19-man delegation would comment concerning their proposed 50 billion electron volt (Bev) accelerator. One reason is believed to be the difficulties Soviet scientists have had in getting their ten Bev machine to work properly. Although it could now be operated at its full power, the beam intensity would be extremely weak so they are concentrating their efforts on increasing beam intensity.

Prof. Vaclav V. Votruba, co-director of the Joint Institute for Nuclear Research, told SCIENCE SERVICE there were "many problems" still to be licked before the world's highest energy accelerator would be working properly. He said they were trying to improve the focus of the magnetic field of the machine's huge magnets, the intensity of the beam of ions before it is injected into the giant circle around which the protons are sped, and the vacuum.

Prof. Votruba, a Czechoslovakian, and others from the Soviet delegation also refused to speculate concerning when the ten Bev machine would be working at full power.

The conference was sponsored by CERN, the European Organization for Nuclear Research, consisting of 12 nations banded together in a joint effort to learn more about the structure of atomic nuclei. One CERN project is to build a 25 Bev accelerator, now scheduled for completion within two years.

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PHYSICS

Nuclear Physics Advances

The past year has seen great progress in nuclear physics in areas ranging from theory to more accurate measurement of the lifetime of a free neutrino.

By ANN EWING
From Geneva

➤ "GREAT PROGRESS" in nuclear physics has been made during the past year, Dr. J. Robert Oppenheimer, director of the Institute for Advanced Study, Princeton, N. J., told SCIENCE SERVICE.

This progress is an understanding of the so-called weak interactions of nuclear particles, which gives scientists a new tool to use as a probe for strong reactions. The new understanding is on a firm foundation both theoretically and experimentally, Dr. Oppenheimer reported.

The famous physicist attended the 1958 International Conference on High Energy Physics held in Geneva at CERN, the European Organization for Nuclear Research operated jointly by 12 nations.

The universal theory of weak interactions concerns the strange world within the atomic nucleus. It was first proposed by Drs. Robert Marshak and E. C. G. Sudarshan of the University of Rochester, N. Y., and, independently, by Drs. Richard P. Feynman and M. Gell-Mann of California Institute of Technology, Pasadena.

Experimental evidence confirming the theory was presented to the Conference by Dr. M. Goldhaber of Brookhaven National Laboratory, Upton, N. Y., who reported his studies and those of others.

One example of a weak interaction in nuclear physics is known as "beta decay," the emission of an electron by a radioactive element. The downfall of the once dearly held theory that parity (the equivalence of an object or system with its mirror image) is conserved resulted from studies of weak interactions. Suggesting that parity is not always conserved won the 1957 Nobel Prize in Physics for two others who attended the Conference, Drs. T. D. Lee and C. N. Yang, also of the Institute.

Further experiments have confirmed that parity is not conserved, Dr. Goldhaber reported. He said, however, that no experiments have yet shown any evidence that time reversal is possible.

One unsolved problem, Dr. Oppenheimer said, is the electric structure of neutrons and protons, fundamental particles of an atomic nucleus. He said he was hopeful this and other problems would yield to solution through use of the new "dispersion relations," which are made possible because weak interactions are now understood.

Neutron's Lifetime

➤ THE RUSSIANS have determined the lifetime of a free neutron more accurately than any previous studies. It is 11.7 minutes with an accuracy of three-tenths of a minute more or less than 11.7.

The new, accurate determination was reported to the meeting by Dr. M. Goldhaber of Brookhaven National Laboratory, Upton, N. Y. Neutrons are fundamental nuclear particles, essential to the production of the fission reactions that give the atomic bomb its "bang" or yield power under controlled conditions.

Dr. Goldhaber also reported that the cross section, or area in which a reaction occurs, for the neutrino has been measured. It is the unbelievably tiny area of the figure one preceded by 42 zeroes of a square centimeter. Or one times ten to the minus 43rd power for the science-minded.

The neutrino is a ghost particle, having virtually zero mass and no electric charge. Its spin is in the right-handed direction, while that of the anti-neutrino is left-handed, Dr. Goldhaber reported.

Heisenberg's Theory

➤ PROF. WERNER Heisenberg's proposed basic equation of matter was strongly criticized by fellow scientists.

The theory was termed "mathematically objectionable" by Prof. Wolfgang Pauli of the University of Zurich, who was associated with Prof. Heisenberg in early stages of formulating the proposed equations but who later withdrew his cooperation.

Prof. Heisenberg of the Max Planck Institute, Gottingen, Germany, has attempted to unify in one theory the strong forces binding together the particles within atomic nuclei and the gravitational forces that govern the motions of planets.

His attempt is unsuccessful, most scientists attending the Conference agreed, after hearing Prof. Heisenberg explain the theory. The proposed equations have been discussed privately by scientists since last February but details were not revealed until this meeting.

A unified field theory, in which electromagnetic and gravitational forces are linked together using only simple, fundamental assumptions was the life-long goal of the late Prof. Albert Einstein. His unified field theory contains mathematics so extremely difficult that scientists expect it will be many years before the theory can be proved or disproved.

Therefore, in describing atomic particles, scientists use the quantum theory. They use another, seemingly unrelated set of equations to describe gravitation.

Prof. Heisenberg said he would continue working on his equations, but other scientists doubted that this would be profitable because of the unsound mathematical assumptions in the theory.

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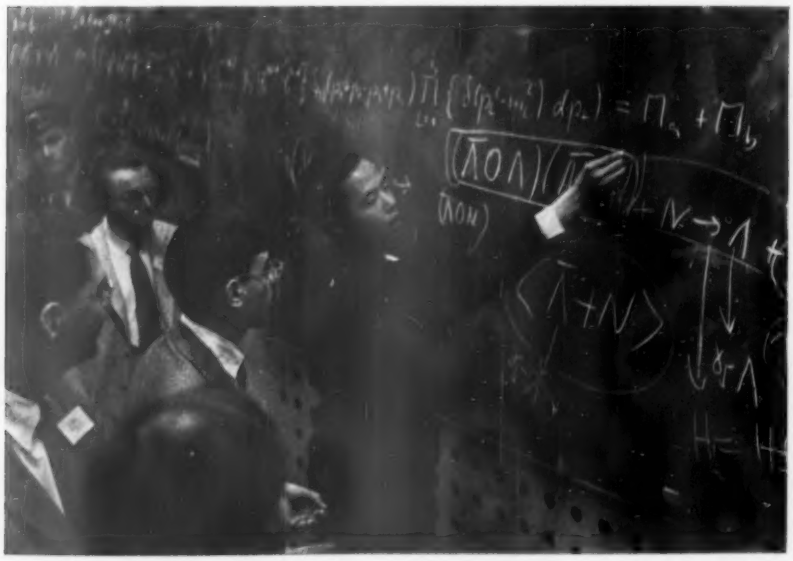

PHYSICS ACROSS THE BOARD—Dr. T. D. Lee is at the blackboard at the international meeting in Geneva.

TECHNOLOGY

"Washing" Method Saves Radioactive Equipment

➤ TECHNICIANS at the General Electric Hanford atomic plant near Richland, Wash., have saved $90,000 in six months by "washing" equipment formerly discarded as too "hot" to handle. Expensive pumps, centrifuges, etc., that workmen could not approach to repair, are now immersed in boiling chemicals and a 28-foot-deep pool of water, reducing radioactive contamination to safe levels.

Science News Letter, July 19, 1958

MEDICINE

Chemical May Cure Cancer

➤ THERE WILL be a chemical cure for cancer, three out of four directors of cancer research laboratories polled have indicated in a SCIENCE SERVICE Grand Jury inquiry.

But it will take some years to achieve a chemical cure for cancer, somewhat similar to successful treatments like antibiotics that have virtually conquered some diseases.

The cancer experts who agree there would be a chemical cure for cancer constituted 78% (18) of those answering, with 9% (2) voting "No" and 13% (3) not voting.

Before 1975 was set by most of the experts foreseeing a chemical cancer cure as the time that it will be achieved. This was the opinion of 61% (11), while 5% (1) was optimistic enough to vote for before 1960. Before 2000 was the guess of 17% (3) while another 17% (3) would not specify a date.

Because a widespread anti-cancer drug research effort, supported by Government and foundation funds is in progress, SCIENCE SERVICE queried by its "grand jury" technique the scientists directing cancer research efforts in this country. Assured of anonymity, of the 30 asked to reply, 77% (23) did so.

One expert pointed out it is inaccurate to speak of a single chemical cure for cancer and that it is extremely unlikely a single chemical substance will be discovered that will cure the many different kinds of cancer.

This scientist believes it is possible that chemical means will be discovered before 2000 which will cure a high proportion of advanced cancers which otherwise will be fatal.

A negative vote was accompanied by the prediction, which was fulfilled, that the results of the poll would be "yes, before 1975" by a landslide majority because "it is now almost heresy in orthodox science to say anything else."

Chemicals are now curing some cancers in animals and inhibiting and giving palliation to some cancers in humans, another expert ponted out.

Leukemia and malignant lymphoma will probably be the first to yield to chemical treatment, another expert observed.

The possibility of development of preventive measures to protect against cancer was also suggested.

"The achievement of great ends by small means is every man's wish," one non-voting expert said. "Such, however, is not ordinarily the way of the world. Whether we shall ever know enough about cancer to prevent it, or to destroy it permanently when it has appeared by chemotherapeutic, immunologic, hormonal or other means, remains to be shown. Such successes today, however effective, are in most areas very temporary, however dramatic the recession may be occasionally. Only in prostatic cancer does the indirect attack (castration or estrogen) commonly permit its victim to live out his life expectancy."

The same expert observed that "for a large number of visceral cancer, the elaboration of a test by which the presence of an occult cancer can be reliably detected in its silent, asymptomatic place could very well during the next decade make a more important impress upon the cancer problem than the discovery of its cause, or causes. It took more than 30 years following the discovery of the tubercle bacillus to implement that knowledge in a manner that brought about a definite decline in the mortality of tuberculosis. Most cancers are curable when local. The problem is to find the early case, just as it is today in tuberculosis."

Science News Letter, July 19, 1958

MEDICINE

Cancer Test Promising

➤ AMERICAN scientists are currently experimenting with a cancer detection technique that could "deal a decisive blow against cancer in the United States."

This was revealed by Dr. John R. Heller, director of the National Cancer Institute, Bethesda, Md., to cancer specialists gathered in London for the International Cancer Congress. (See pp. 35, 36, 47.)

The detection technique involves exfoliative cytology whereby cells that are normally and continuously being sloughed off by the body's organs are collected and studied in the laboratory. The test itself is not a diagnosis for cancer but a first step in warning doctors that suspicious cells are present within the body. It is the hope of cancer researchers that the technique will give them their first mass screening procedure for detection of cancer in sites in the body.

The anti-cancer weapon was evolved by Drs. George N. Papanicolaou and Herbert F. Traut and proved highly successful in a Memphis, Tenn., study of 108,000 women to detect uterine cancer.

The Memphis results were so encouraging, Dr. Heller told the Congress, that t National Cancer Institute decided to obtain additional data as applied to uterine cancer and to undertake research to learn the usefulness of the technique for detecting cancer of the lung, large bowel, urinary bladder, and prostate gland.

Currently 12 such Institute studies are underway in the U. S., with two in Columbus, Ohio, and one each in Houston, Tex., Kansas City, Mo., Louisville, Ky., Madison, Wis., Memphis, Tenn., Philadelphia, Pa., San Diego, Calif., Washington, D. C., Hagerstown, Md., and Winston Salem, N. C.

"If success should attend our efforts to demonstrate the value of exfoliative cytology as a case-finding procedure and an aid to diagnosis," Dr. Heller told his colleagues, "we shall be able to deal a decisive blow against cancer in the United States.

"We believe that mortality from uterine cancer, which now claims the lives of 16,000 women each year in our country, could be dramatically reduced by widespread use of the cytologic test as a health practice.

"If, for instance, the test should prove effective for the early detection of epidermoid cancer of the lung, which is taking an increasing toll in the United States, as well as for cancer of the other sites I have mentioned, we would indeed have an effective weapon to place in the hands of health authorities and the medical profession."

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RADIO

Saturday, July 26, 1958, 1:30-1:45 p.m., EDT

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Dr. Frank H. Sparks, president of the Council for Financial Aid to Education, New York City, will discuss "Who Should Pay for Higher Education?"

EDUCATION

Change in Emphasis Seen In Medical Education

➤ NEW IDEAS of "coordinated" training for medical students are evolving in individual schools and in teaching institutes of the Association of American Medical Colleges.

As outlined by Dr. Robert A. Moore, president of the Downstate Medical Center of State University of New York in Brooklyn, in the *Journal of the American Medical Women's Association* (March), a composite of these innovations would include:

1. Two years of liberal arts education.
2. One year of transition from college to medical school.
3. Four years of medical school, including internship.
4. Reorientation of course material to emphasize the human body as a whole, rather than scientific disciplines.
5. A school year of at least 40 weeks; 48 to 50 weeks in the final year.
6. Assignment to each student of a family which he would follow during the entire period of medical school.
7. A coordinated outpatient program that would include home care.

Principles and processes, rather than detailed facts, must now be the goal, Dr. Moore says, since no individual can hope to remember even a small part of the facts now accumulated by the medical sciences.

New concepts of comprehensive medicine demand the same originality and imagination in researching educational methods as are necessary in research on scientific subjects, says Dr. Moore.

Science News Letter, July 19, 1958

ELECTRONICS

"Perceptron" Thinks

➤ THE FIRST non-living mechanism able to "perceive, recognize and identify its surroundings without human training or control" has been developed for the U.S. Navy.

The electronic device, which officers hesitate to call a machine because it is so much like a "human being without life," has been demonstrated in a preliminary form.

"Perceptron," as it is called, needs no "priming." It is not necessary to introduce it to surroundings and circumstances, record the data involved and then store them for future comparison as is the case with mechanical "brains" in their present stage of development.

The Perceptron literally teaches itself to recognize objects the first time it encounters them.

It uses a camera-type lens to scan objects or survey situations, and an electrical impulse system patterned point-by-point after the human brain does the interpreting of the information.

The device was developed under an Office of Naval Research contract by Dr. Frank Rosenblatt, research psychologist, Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y.

An actual working machine will be completed in about one year. The concept of Perceptron was demonstrated on a conventional IBM 704 computer, the same type of computer used to develop the concept.

In one early experiment, Perceptron was shown 100 squares located at random either on the right or left side of cards. In 100 trials, Perceptron was able to "say" correctly 97 times whether a square was located on the right or left. Researchers said it was "obvious" after the machine had seen only 30 to 40 squares that it had learned to recognize the difference between right and left, almost the same way a child learns.

Printed pages, longhand letters and even speech commands are within reach of the device.

Only one more step of development, a difficult step, is needed for the device to hear speech in one language and then reproduce it either in writing or verbally in another language.

Science News Letter, July 19, 1958

AGRICULTURE

Test Rust-Resistant Wheat

➤ ONE OF the nation's worst wheat diseases, leaf rust, has been reduced from 75% severity to a bare trace in crops of hybrid winter wheat.

While these results were obtained in experimental research, they are promising. Research in growing rust-resistant wheat is proceeding at cooperative stations where the U. S. Department of Agriculture works with state scientists in solving various agricultural problems. Every year, in every wheat-producing state, leaf rust destroys between five percent and 30% of the wheat crop.

The gains made in controlling leaf rust are based on the work of Dr. E. R. Sears, USDA plant geneticist at Columbia, Mo., who has succeeded in transferring rust resistance from goat grass to common wheat. Goat grass, or *Aegilops umbellulata,* is a distant relative of wheat that is practically immune to leaf rust.

Researchers in six states are using the rust-resistant wheat developed by Dr. Sears in breeding commercially useful wheat. The resistant wheat is not in itself breeding stock; it does not have the other necessary characteristics of high production, hardiness and so on. However, a number of hybrid lines of winter wheat have been bred, using the resistant wheat. They are now being tested for the farmers' crops.

The minimum time for a breeding cycle for wheat is eight years. This is the amount of time scientists need to tell if they have a reliable hybrid, one that will continue to produce wheat with the desired qualities. In Kansas, where researchers obtained almost a 75% reduction in leaf rust, about three years have been spent in the program.

It will be another five to 12 years before the farmer can expect to grow leaf-rust-resistant wheat.

Dr. Sears recently was awarded one of the nation's highest honors in agricultural research, the $10,000 Hoblitzelle National Award in the Agricultural Sciences. He was selected for the biennial award for his work in transferring rust resistance to wheat.

Science News Letter, July 19, 1958

MEDICINE

Rheumatoid Arthritics Helped by New Program

➤ An individualized program for gold salts therapy in rheumatoid arthritic patients has resulted in complete remission in patients who were formerly classified as failures.

Formerly, group therapy was used instead of individual programs, resulting in various side reactions and responses by individual patients.

An experiment conducted on 138 patients receiving gold salt injections revealed that the amount of gold excreted in the urine varied proportionately with the amount administered.

Since individual patients differed in their excretion rates for gold, any fixed dosage schedule must result in toxic symptoms in some and therapeutic failure in others. The toxicity was a criterion for the adequacy of the dose, Drs. Richard T. Smith, William P. Peak, Kenneth M. Kron, Irvin F. Hermann, Russell A. DelToro and Mr. Meyer Goldman, all of the Benjamin Franklin Clinic in Philadelphia, report in the *Journal of the American Medical Association* (July 5).

Individualized programs induced remissions in 82% of 347 patients, between 12 and 18 weeks after commencement.

The aim of the individual program is to build a level of gold in the body of the patient sufficient to produce remission while maintaining a level that will induce permanent remission. Much of the gold administered in group therapy was lost or excreted by some patients while retained by others, the doctors point out.

Urinary excretion of gold was carefully charted and toxicity symptoms were recorded until the required dosage was able to be computed for individuals.

In general, variations in patient response to gold salt therapy are due to the wide differences in the retention and excretion of the gold, the scientists conclude.

Science News Letter, July 19, 1958

SUPER CUTTER—Electro-chemical machining, a technique in which chemicals and electricity are used for cutting instead of the ordinary metallic tools, is demonstrated by A. E. Howe, a laboratory engineer at General Electric Company's Schenectady, N. Y., engineering laboratory. There is no physical contact between the electrolytic cutting tool and the object being machined. The glass tube shown in the photograph never touches the metal plate below it, yet the metal is being punctured. In the future, engineers believe, this may be a practical method for machining the tough, heat-resistant metal alloys now being used in airplanes and missiles. Work continues to find the most effective use of the method.

ROENTGENOLOGY

Microradiographic Lab Established at UCLA

➤ A MICRORADIOGRAPHIC laboratory for taking tiny X-ray pictures of microscopic tissue has been established at the University of California at Angeles Medical School.

The new unit, first of its kind in the United States, is under the direction of Dr. Richard C. Greulich.

Techniques to be used in the laboratory were described in the recently published volume, *X-ray Microscopy and Microradiography* (The Academic Press, New York).

Microradiograms of tiny clumps of cells are ultimately expected to provide a quantitative elementary analysis of individual cells and cell components, and currently may be used to determine the weight of a variety of microscopic structures.

Thus, much more may be learned about the vital processes of cells, such as those in our glands, as well as about the roles of vitamins, enzymes and minerals in living tissues.

Techniques are based on the same principles as those of conventional X-ray imaging. However, very fine-grained photographic emulsion is necessary for the high resolution required to distinguish adjacent regions of altered mass or chemistry.

Very low-energy X-ray beams are used, as the stronger rays used in bone studies would penetrate soft tissue so readily that there would be too little contrast in the photos for them to be of any value. The specimen must be in a vacuum so that the low-energy X-ray can penetrate air molecules sufficiently to produce a good negative.

The microradiograms of tissue specimens are about the size of a postage stamp and are examined in the light microscope.

These techniques will not replace traditional light and electron microscope studies of tissue, Dr. Greulich points out. They will, however, be a valuable new approach in the effort to extend our knowledge of complex cellular processes.

Science News Letter, July 19, 1958

MEDICINE

Antibiotic Fights Staphylococcus

➤ AN ANTIBIOTIC that is active against strains of staphylococcus that other antibiotics do not affect has been introduced.

The antibiotic, kanamycin, is very active against clinical strains of staphylococcus resistant to the commonly used antibiotics, penicillin, streptomycin, the tetracyclines, erythromycin, chloramphenicol and novobiocin, researchers at the Bristol Laboratories in Syracuse, N. Y., reported at a conference on the antibiotic meeting in New York.

Combinations of kanamycin, named Kantrex by Bristol, and penicillin indicate that there is no interference with each other's action and that the two antibiotics are consequently compatible, A. Gourevitch, V. Z. Rossomano, T. A. Puglisi, J. M. Tynda and J. Lein of Bristol, said.

Kanamycin's action is bactericidal rather than bacteriostatic. It kills bacteria instead of inhibiting bacterial growth.

Kanamycin proved effective in the treatment of many acute infections in mice as well as long-term infections produced by virulent staphylococci, George A. Hunt and Alvin J. Moses, also of Bristol, reported.

Kanamycin's success as an antituberculosis drug was reported this spring at the 54th annual meeting of the National Tuberculosis Association in Philadelphia. (See SNL, May 31, p. 344.)

The antibiotic was first discovered in Japan in 1957 by Dr. Hamao Umezawa of Tokyo University. It is made from a mold related to that from which streptomycin and another antibiotic, neomycin, are derived.

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ARCHAEOLOGY

Rome's Founding Legend Confirmed by Bones

➤ IN A HEAP of ancient bone fragments that have lain unidentified for more than half a century in Rome's Antiquarium Forense, scientists have found confirmation for a legend about the founding of ancient Rome.

The new find is reported in *Nature* (July 5) by Drs. G. A. and A. C. Blanc of the University of Rome.

Three of the bone fragments are now known to belong to an exceptionally large vulture, either the black vulture or the griffon vulture. They were found in 1899 by Giacomo Boni, director of the diggings in the Roman Forum, where they lay with votive bronze statuettes and sherds of the sixth to seventh century B.C., around the monument marking the burial of Romulus or of his adoptive father Faustulus.

The vulture is a non-edible bird, difficult to capture, particularly in Roman times. It was protected by religious interdictions, being considered sacred to Mars and preferred to any other bird for taking omens.

Buried with Romulus, the bones of the bird are believed to be obviously a reference to the story of the foundation of Rome.

The legend has come down to us in the writings of Titus Livius and other classical authors. Romulus and his twin brother Remus were said to have decided to settle their quarrel on where the new town should be founded by accepting an omen from the gods. Remus watched from the Aventine Hill, Romulus from the Palatine. First, Remus is reported to have seen the flight of six vultures. Romulus is said to have seen 12. Remus, suspecting a cheat, moved towards his twin brother. But at that moment, Romulus really saw 12 vultures, and Remus had to accept the divine command revealed by the omen.

Discovery of vulture bones around the monument to Romulus gives confirmation to the ancient legend.

Science News Letter, July 19, 1958

IN SCIENCE

AGRICULTURE

Nematodes Survive Man-Killing Radiation

➤ NEMATODES may be the only survivors following an atomic war. A radiation dose strong enough to kill more than 180 men will not kill one tiny golden nematode, U. S. Department of Agriculture scientists have found.

While the dosage considered invariably lethal to man is 650 roentgens, it takes 120,000 roentgens or more to kill this nematode. Some other species of this tiny plant-killer can take 350,000, or as much as 640,000 roentgens, before succumbing to the radiation effects. The female golden nematode can also withstand radiation up to 20,000 roentgens before being sterilized.

These minute worm-like parasites of plants cause millions of dollars of damage to farmers' crops each year and USDA scientists have been searching for ways to destroy the nematodes.

Radiation is unsuccessful, they reported, since lethal doses are high enough to injure the living plants.

Science News Letter, July 19, 1958

HORTICULTURE

Double Snapdragons May Rival Roses

➤ ROSES, CARNATIONS and chrysanthemums; look to your laurels!

Double snapdragons may some day become a rival commercial flower crop that could be grown in California and sold in eastern markets.

Dr. Anton M. Kofranek, assistant professor of floriculture at the University of California at Los Angeles, says the double type has built-in features that might make it economical to grow and ship over long distances.

Besides having about twice as many petals as singles, double snapdragon petals are mechanically "locked in," says Dr. Kofranek.

This overcomes a weakness that has prevented shipment of singles to distant markets. Petals of singles fall off because of the ethylene gas the flower gives off.

"But you could ship doubles from Los Angeles to Nome, Alaska, without losing petals," says the UCLA floriculturist.

Doubles have disadvantages. They are not as pretty as singles and must be propagated from cuttings. Rust often carries over from plant to plant during propagation.

But grown in quantity, with good quality, and marketed at a relatively low cost, double snapdragons might make good sales in the East, Dr. Kofranek suggests.

Science News Letter, July 19, 1958

CE FIELDS

MEDICINE

New Diagnostic Tool Employs Ultrasound

➤ A DEVICE has been successfully used to sound out lumps or masses within the abdomen.

The ultrasonic scanning device was used on 100 patients to diagnose pregnancy and pelvic and abdominal tumors.

The ultrasonic probe is moved slowly across the abdomen. Echo patterns created by the ultrasound are reflected to an oscilloscope. Images created by these echo patterns can then be interpreted, Dr. Ian Donald, professor at the University of Glasgow, reports in the British journal *Lancet* (June 7).

The process usually takes between one and one-half to two and one-half minutes, and causes no discomfort to the patient, Dr. Donald explains.

Dr. Donald and co-workers, J. MacVicar, gynecological registrar, Western Infirmary, Glasgow, and T. G. Brown of Messrs. Kelvin Hughes Ltd., photographed examples of echo patterns of scanned abdominal regions. The pictures include various ovarian cysts, healthy abdomens, a thigh, and a uterus with twins.

The possible harmful effects of the use of ultrasonic beams for diagnosis appear to be negligible, the scientists say.

However, inadequate scanning methods are producing somewhat crude results. Further development is needed before the ultrasound pulses can be intelligible and consistently reproducible.

The possibility of diagnosing benign and malignant tissue by this simple, quick and harmless method awaits further testing. Nevertheless, further refinements in technique may provide a useful diagnostic weapon in cases in which X-ray diagnosis is either impractical or undesirable, they point out.

Science News Letter, July 19, 1958

MEDICINE

Egg Yolk Factor May Promote Cancer Growth

➤ A CZECHOSLOVAKIAN scientist has indicted egg yolk as a promoter of cancerous growths.

The growth-promoting factor in egg yolk is suspected to be identical to tumor growth factor, Jan Hradec, department of biochemistry, Oncological Institute, Prague, reports.

A high incidence of malignant tumors had been recently reported in a group of mice fed egg yolks. The growth-promoting factor in egg yolk has since been suspected as the responsible agent for this high percentage of cancers, Mr. Hradec explains in *Nature* (July 5).

Extensive research into this problem revealed that:

1. The tumor growth-promoting factor is present in only minute quantities in normal mice and rats, as compared to its presence in organs of tumor-bearing animals.

2. It resembles, chemically, an aromatic hydrocarbon, possibly some bile acid.

3. The growth factor from tumor tissue and the growth factor from egg yolk were identical in their chromatographic behavior and absorption spectra, two methods of identification of chemicals.

The next step will be the chemical identification of this egg yolk growth factor to determine how closely it chemically resembles the tumor growth factor, the Czechoslovakian scientist says.

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NATURAL RESOURCES

Nuclear Energy Will Not Solve Power Problems

➤ THE AGE of nuclear energy is not as near as you may have thought.

It will be sometime before the coal pile becomes obsolete and the United States can stop relying on foreign import of oil for fuel.

These are some of the conclusions of a National Planning Association study.

Twenty years from now, the study shows, the U. S. will still be depending upon coal and oil to supply its growing energy needs. Atomic energy will be contributing only about 10% of the total energy consumed, or the equivalent of some 270,000,000 tons of coal out of a total of 3,000,000,000 tons.

We may even have to tackle the problem of tapping energy from the sun and using controlled thermonuclear fusion or H-power, the study suggests.

Nuclear energy cannot be expected to be a cure-all for the nation's dependence on the fluid fuels secured in part from lower-cost, but strategically vulnerable, foreign sources.

Nations such as the U.S., in comparison with those like Great Britain whose conventional power costs are high, will probably continue to depend on the conventional fuels for many years. However, regions where energy costs are high will benefit with nuclear energy's competitive entry into the power field. Industries will be freer to choose their locations with respect to markets and raw materials other than coal, water power and so on.

Other findings of the report which was prepared by Perry D. Teitelbaum of the Corporation for Economic and Industrial Research, include:

1. Estimated increases in cost of conventional fuels range between 15% and 20% by 1980, indicating nuclear energy costs will have to decline in order to compete.

2. Development of a synthetic liquid fuels industry would control oil prices, assure a domestic supply of liquid fuels and provide a use for coal as it competes with nuclear fuel.

3. Exports of nuclear materials, hardware, technical know-how may be an important and profitable by-product of nuclear power.

Science News Letter, July 19, 1958

MEDICINE

Common Cold Germs Produce Antibodies

➤ THE INFECTIOUS agents that cause the common cold are able to stimulate the body to produce antibodies that fight the cold.

Therefore, the cold-causing agents are antigenic and are responsible for some antibodies that circulate in the human body. Experiments by Drs. George G. Jackson, Harry F. Dowling and Truman O. Anderson of the University of Illinois College of Medicine, Chicago, indicate that:

1. Common cold infectious agents are widespread.

2. These antigens produce antibodies in human gamma globulin that neutralize the action of the infection.

3. The common cold in adults is usually located in the mucous membranes of the upper respiratory tract. Repeated tests have shown the gamma globulin antibody is found in nasal secretions. These antibodies, however, do not act against the cold. Therefore, antibodies may be of little importance in the prevention of a local infection of the mucous membranes of the upper respiratory tract.

4. When volunteers received "nose drop" doses of infectious agent plus a mixture of "pooled" gamma globulin from many humans, only 20% of the tested group suffered colds. Approximately 50% of the groups that received the infectious agent but no gamma globulin developed colds, Dr. Jackson told SCIENCE SERVICE.

The knowledge that antibodies can fight the common cold will play an important role in the feasibility of developing a common cold immunizing vaccine, Dr. Jackson says in *Science* (July 4). However, further research is needed.

Science News Letter, July 19, 1958

MEDICINE

Insulin, Glucagon Found To Inhibit Tumor Growth

➤ INSULIN, long recognized as a successful agent in the treatment of diabetes, exhibits definite tumor growth-inhibiting action.

The administration of insulin alone inhibited the growth of rat tumors by 10%. Tumor growth was also slowed approximately 30% by administration of glucagon, a sugar, Drs. J. M. Salter, R. De Meyer and C. H. Best of the Banting and Best Department of Medical Research, University of Toronto, report in the *British Medical Journal* (July 5).

A combination of both glucagon and insulin inhibited growth in 50% to 70% of the particular tumor, they say.

However, when treatment is stopped, the growth resumes at a normal rate. Further studies of the effects of the two agents on the growth of a variety of tumors are underway.

Perhaps the two together "starve" the tumors, the scientists suggest.

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AGRICULTURE

'Cides on Every Side

Scientists look for better weapons to use against the insects, weeds, rodents and fungi that destroy crops and endanger both man's health and the health of livestock.

See Front Cover

By BENITA TALL

➤ THE "'CIDES", insecticides, herbicides, rodenticides and fungicides, are here to stay. They have become an important part of everyone's life, including the white collar worker as well as the farmer.

Because of the pesticides, as these chemical compounds are collectively called, millions of human lives have been saved, bigger crops are being grown by fewer farmers on less land, and livestock is more productive.

Many persons are unaware of the use of pesticides, and the problems entailed in their use, until there is an uproar such as the controversial imported fire ant and gypsy moth eradicating campaigns now being conducted by the Federal Government with state cooperation.

Two decisions were made in waging these campaigns. First, for example, in the case of the gypsy moth program, it was decided that the insect could be eradicated rather than controlled. Second, it was decided that DDT spraying of infested areas would be the most effective treatment.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows the gypsy moth caterpillars or larvae as they feed voraciously on tree foliage. As soon as it turns warm in spring the larvae hatch from eggs laid the previous summer.

Neither the fire ant nor the gypsy moth are native to this country. This means there are no widespread natural controls such as predatory insects, diseases or resistant plants. Insecticides become the only weapon if an immediate eradication program is desired.

War on Pests

Both decisions have been argued by scientists, conservationists and others concerned in the gypsy moth program. Past eradication programs have been successful, yet some experts doubt if the moth can be completely wiped out.

Others claim that widespread use of DDT in as strong concentrations as are being applied endangers human beings as well as wildlife. Evidence has been presented of mass wildlife killing traceable to the insecticide. However, in the absence of a better way to combat the gypsy moth now, the Government's program continues.

At the same time scientists in both Government and industry continue to add to the pesticide armaments that are so important to the American economy. The controversy has made necessary more, as well as safer and better, insecticides.

A whole new range of pesticides were introduced beginning in the 1940's. Actually the large scale use of DDT—1,1,1-Trichloro-2,2-bis (p-chlorophenyl) ethane—at the time could be considered the beginning of what is today a multimillion dollar chemical industry producing literally thousands of pesticides. From "Aldrin" to "Ziram" there is now a compound to combat many of the pests that cost the American economy $9,000,000,000 a year.

There are many different ways a pesticide does its work. Some are tailormade for use on particular crops or against particular insects. Others have a wide range of application.

Generally, the pesticides can be classified on the basis of how they kill. For example, a compound may destroy harmful insects in one of four ways: by putting a poisonous coating on the food on which it feeds (stomach poisons); by direct application of the poison through dusts or sprays (contact poisons); by toxic compounds applied to the soil or plant itself that are taken up by the plant on which the insect feeds; and attractants.

Chemical Attractant

This last group, the attractants, are chemical sirens that work by attracting the insect pest to its doom. A desirable characteristic of these insecticides is their specificity: usually there is a particular odor that will attract the one harmful insect, thus reducing danger of poisoning useful insects.

Herbicides have been formulated that are quite selective. Grasses, cereals and related plants, for example, are not injured by applications of the now widely used 2,4-D. Many harmful weeds are killed, however. Other selective herbicides kill only woody plants and brambles. Strange as it may seem, there is a place for non-selective herbicides or compounds that destroy all forms of plant life. Sending men out to weed roadways or railway beds would be extremely expensive and inefficient; an application of sodium arsenate, one non-selective herbicide, to the overgrown land answers the problem.

The agricultural gains traceable to the use of pesticides approach the unbelievable. Milk production showed a marked increase with the appearance of a new insecticide in the mid-1940's. About the same time insecticides for pests affecting tomatoes and snap beans appeared and there was a phenomenal rise, about a 15% increase, in production of both these vegetables.

In terms of human disease, the pesticides have accounted for the gains made against insect-carried diseases such as malaria, typhus fever, trachoma and dysentery. Some 5,000,000 lives have been saved and 100,000,000 illnesses prevented in the United States since 1942, the U. S. Public Health Service estimates, by the use of insecticides.

As recently as 1945 there were 49,966 cases of malaria reported in 14 southern states. In cooperation with the Public Health Service the states began an intensive house spraying program in 1947. By 1948, the number of reported malaria cases had dropped to 9,356. Today the disease is considered "eradicated" in the United States.

Still more diseases, sleeping sickness, dengue and urban yellow fever, are probably subject to control by insecticides, U. S. Public Health experts agree.

Through international agencies such as the World Health Organization, the results of American studies of disease control through insect control are made available to other nations.

With every new use of a pesticide, as well as with every new pesticide, the question of toxicity arises. Chemical compounds powerful enough to kill insects and plants may harm man. This is one phase of the toxicity problem. The other concerns the complex problem of upsetting the delicate balance of nature and of causing possible harm to wildlife.

Much has been done and is being done to safeguard persons against pesticide poisonings.

The pesticide chemical industry estimates that, on the average, toxicity tests of a new compound take two or three years, accounting for almost half of the $1,500,000 spent in developing just one pesticide chemical. These tests are designed to point out dangers in handling the prospective pesticide, indicate the effectiveness of various formulations, whether powder, spray or grains, and to set limits as to safe residues on food products. In addition, short term and long range tests, both in the laboratory and field, are conducted to discover what biological changes occur in an animal due to the pesticide.

Two-Way Protection

The Federal Government protects the individual against the dangers of pesticide poisoning in two ways: through tests and research conducted by the U. S. Department of Agriculture; and by means of standards enforced by the Food and Drug Administration.

In 1954 the Pesticide Chemicals Amendment to the Federal Food, Drug, and Cosmetic Act became law. Under this law, commonly known as the Miller Bill, tolerance levels have been set for many pesticides. Setting these tolerances, the minimum amount of pesticides that may safely appear on or in a food product, means knowing what happens chemically when, for example, a pesticide is exposed to weather-

ing or when two "safe" compounds are applied to one crop or what happens biologically when a cow eats sprayed forage crops.

A good example of the care taken to protect against pesticide poisoning is the minimum tolerance set for milk: zero.

If there is the remotest possibility that a compound could injure human beings, no trace of it is permitted in milk. Recently a zero tolerance was set for methoxychlore and malathion. The establishment of the "no residue" ruling for milk for these widely used compounds focuses attention on a relatively new kind of 'cide: "natural" killers.

Natural Safe 'Cides

Pyrethrum is perhaps the best known of the botanical insecticides which leave no residue. A plant product, it has been approved for uses where other compounds cannot be used because of the residue danger.

Biological warfare against insects, while still in its infancy, is expected to eliminate effectively specific insects without doing other harm.

Scientists working on this problem have found viruses and other disease-causing organisms such as nematodes that are specific for particular insects. Treatment of crops or protection against insect invasion by means of biological controls is also inexpensive. It costs only a few cents to spray a field or a forest with a water solution containing an insect virus. Already, effective control of some diseases affecting forest trees has been brought about through biological controls.

For the foreseeable future, however, chemistry will continue to provide the compounds that have helped assure a growing food supply, protection against some diseases, and leafy forests.

Science News Letter, July 19, 1958

ZOOLOGY

700-Legged Millipede Discovered in Panama

➤ A MILLIPEDE that comes close to really being a "thousand-legs" has been discovered living in a Panama valley.

A grand total of 700 legs keep the animal's wormlike body in action. Its body consists of 175 segments, strung one after the other, each with four legs. Each set of legs can act more or less independently of the others.

H. F. Loomis of Miami, Fla., an expert on millipedes, discovered the new species while investigating this class of invertebrates at Barro Colorado Island, the Smithsonian Institution's tropical-life preserve in the Panama Canal Zone.

He also found more specimens of a new family of millipedes, one with only 20 segments and 80 legs, that are capable of rolling themselves into very tight and very small balls.

Millipedes, Mr. Loomis says, are different from centipedes in many ways other than their number of legs. While centipedes feed on small insects and lower forms of animal life, millipedes are vegetarians. Their favorite food is decaying vegetable matter and they are sometimes found living under rotting logs.

Even though the millipede is probably one of the least aggressive animals, Mr. Loomis warns that some species are poisonous. There seems to be a poison gland in most segments of these millipedes. They are able to coordinate the glands' action, sending out a spray of a highly caustic substance. Mr. Loomis reports being temporarily blinded in one eye, and part of his face temporarily paralyzed, when he "got in the way" of this poison spray.

The newly discovered millipede has the second largest number of legs yet known. Some years ago, Mr. Loomis discovered an American species with 190 four-legged segments, more than 750 legs.

Science News Letter, July 19, 1958

MEDICINE

Alcoholics Classify Selves Into Different Types

➤ ALCOHOLICS classify themselves into two groups: the solitary or the sociable drinking alcoholic.

The solitary drinker recognizes himself as such and prefers complete solitude in which to engage in drinking.

The sociable drinking alcoholic, on the other hand, feels uncomfortable alone, both when sober or drunk, and will go to extremes to find at least one person to drink with him. He prefers, however, to do his drinking with a crowd of friends.

This is revealed by a study of 245 white male alcoholics made by Dr. Joan K. Jackson of the University of Washington School of Medicine and the Firland Sanatorium, Seattle.

The study also showed the following characteristics of alcoholics:

1. Sociable alcoholics had been heavy drinkers for a median of 17.5 years, while the median for solitary alcoholics was only 15.3 years.

2. The solitary alcoholic experienced anxiety about having enough to drink, gulping drinks and needing more alcohol to get the same effect, more frequently than the sociable alcoholic. The solitary alcoholics seem more anxious about morning drinking and protecting the supply of alcohol than do the sociable alcoholics.

3. The solitary exceeded the sociable alcoholics in justifying their neglect of family responsibilities, feeling that others should show them more consideration and suspecting that others felt pity or contempt for them.

4. More solitary than sociable alcoholics came from the middle class. The pattern of all-male drinking in bars tends to be most characteristic of lower class groups. The middle class emphasis on respectability, self-control and achievement may influence the solitary alcoholic to withdraw from social participation when drinking.

The common belief that periodic alcoholics will eventually become steady alcoholics was not substantiated by this study, Dr. Jackson reports in the *Quarterly Journal of Studies on Alcohol* (June).

Science News Letter, July 19, 1958

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ABBREVIATIONS DICTIONARY: Abbreviations, Contractions, Signs & Symbols Defined—Ralph de Sola—*Duell*, 177 p., $4. Includes Greek alphabet, radio alphabet, Roman numerals, ship's bell time signals, international civil aircraft markings.

THE AIR OVER LOUISVILLE: Summary of a Joint Report—Special Air Pollution Study of Louisville and Jefferson County, Kentucky, 1956-1957—*Public Health Service, Robert A. Taft Sanitary Engineering Center*, 57 p., illus., paper, free upon request direct to publisher, Cincinnati 26, Ohio.

AIR PHOTO AND SOIL MAPPING METHODS: Appraisal and Application—Preston C. Smith and others—*Highway Res. Bd.*, 38 p., illus., paper, 80¢. Contains state by state index of geologic mapping investigations in the U. S.

BASICS OF DIGITAL COMPUTERS, Vols. I, II, and III—John S. Murphy—*Rider*, 416 p., illus., paper, $2.50 per volume, 3 vol. set, $6.95, cloth $7.95. Picture-book course of the development and basic theory of computer arithmetic, discusses elements, circuits and magnetic cores. Vol. III discusses types of memory, control system, and input-output equipment.

A BIBLIOGRAPHY OF DIFFUSION OF GASES, LIQUIDS AND SOLIDS IN SOLIDS: 1890 to 1955—Frank E. Jaumot, Jr.—*AEC Technical Information Service Extension, (Office of Technical Services)*, 314 p., paper, $3.50.

CATALOGUE OF THE TYPE SPECIMENS OF REPTILES AND AMPHIBIANS IN CHICAGO NATURAL HISTORY MUSEUM—Hymen Marx—*Chicago Natural Hist. Mus.*, 87 p., paper, $1.25.

CHEMISTRY PROBLEMS—Joseph F. Castka—*Holt*, 344 p., paper, $2.16. A work-text and source book for the high school student seriously interested in chemistry, deals mainly with mathematical chemistry. Features type problems helpful for the self-teaching gifted student.

CONCEPTS OF CLASSICAL OPTICS—John Strong—*Freeman*, 692 p., illus., $9.50. Textbook intended for an intermediate course in optics, running through either one or two terms.

CONCRETE FOR RADIATION SHIELDING: Compilation No. 1—Edwin J. Callan and others—*Am. Concrete Institute*, 132 p., illus., paper, $4. Papers on use of concrete for shielding nuclear radiation and the calculation of proportions and properties of various heavy concretes.

CONSTRAINT AND VARIETY IN AMERICAN EDUCATION—David Riesman—*Doubleday*, 2nd ed., 174 p., 95¢. The author feels that the cause of improved higher education would be enormously aided if some impartial yet fearless agency could issue candid reports on colleges of the sort Consumers Union publishes on commodities.

THE CONSTRUCTION OF INFLUENCE LINES WITH A MECHANICAL INTERFEROMETER—D. H. Pletta and J. H. Sword—*Va. Polytechnic Institute*, 12 p., illus., paper, 25¢. Experimental results obtained agree closely wtih results of theoretical investigations.

DICTIONARY OF MILITARY TERMS: English-German and German-English—Friedrich Krollmann—*Philosophical Lib.*, 780 p., $10. Incorporates the great changes in military terminology of the past decade.

ELECTROCARDIOGRAPHY—Michael Bernreiter—*Lippincott*, 134 p., illus., $5. Outlines for medical students the fundamental aspects of cardiography as they are encountered in everyday practice.

ELECTROSTATICS—Alexander Schure, Ed.—*Rider*, 64 p., illus., paper, $1.35. A text on the behavior of electrical charges at rest, both in practical and theoretical situations.

THE EXPLORATION OF SPACE BY RADIO—R. Hanbury Brown and A. C. B. Lovell—*Wiley*, 207 p., illus., $6.50. Describes some of the results and possibilities of the investigation of the universe by radio methods.

FUNCTION FLUCTUATION—Charles C. Anderson—*Cambridge Univ. Press*, 104 p., paper, $4. In psychological testing the risk of error is considerable because the function (ability, trait, attitude, preference) being measured fluctuates from day to day.

GOLDFISH IN YOUR HOME—Herbert R. Axelrod and William Vorderwinkler—*Sterling*, 144 p., illus. with photographs, $2.95. Contains data on care and feeding, treatment of fish diseases, water conditions, necessary for the owner of goldfish.

H. A. HARTLEY'S AUDIO DESIGN BOOK—H. A. Hartley—*Gernsback*, 224 p., illus., hard cover, $5., paper, $2.90. Offers the hi-fi fan the practical design data he needs.

HOME CARE FOR THE EMOTIONALLY ILL—Herman S. Schwartz—*Sessions*, 234 p., $5. Discusses the instances in which family care, under a doctor's guidance, can help the emotionally distressed, the alcoholic, aged, or chronic patient.

HOW AND WHERE TO LOOK IT UP: A Guide to Standard Sources of Information—Robert W. Murphey, foreword by Louis Shores—*McGraw-Hill*, 721 p., $15. Discusses reference works and their use, basic types of reference sources and includes specific sources of information. Subject matter and title index.

ILLUSTRATED PREOPERATIVE AND POSTOPERATIVE CARE—Philip Thorek—*Lippincott*, 98 p., illus. by Carl T. Linden, $5. A monograph of lectures on the subject.

INSECTS AND MITES OF WESTERN NORTH AMERICA—E. O. Essig—*Macmillan*, rev. ed., 1050 p., illus. $18. Incorporates the many revolutionary changes in entomology since the book first appeared in 1926 under the title of INSECTS OF WESTERN NORTH AMERICA.

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THE NEUTRINO—James S. Allen—*Princeton Univ. Press*, 168 p., illus., $4.50. Surveys all the information now available on the neutrino, including also the new post-parity experiments.

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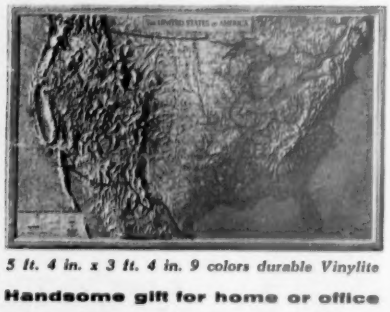

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THE PURSUIT OF EXCELLENCE: Education and the Future of America—Panel Report V of the Special Studies Project—*Rockefeller Brothers Fund (Doubleday)*, 49 p., graphs, paper, 75¢. On the ability of a free people to identify, nurture and wisely use its own talents.

SCIENTIFIC GLASSBLOWING—E. L. Wheeler, preface by G. Ross Robertson—*Interscience*, 478 p., illus., $9.75. The modern glassblower of special types of glass, fancy fractioning columns, standard taper ware, and numerous high-vacuum devices, has become the research chemist's co-worker.

SUMMARY OF ADDRESSES, DISCUSSIONS AND RECOMMENDATIONS: Proceedings of Southern Regional Conference on Aging, 1958—*Council of State Governments*, 84 p., paper, $1.50. Evaluations of a working conference of state officials.

TABLE OF RADIOISOTOPES ARRANGED ACCORDING TO HALF-LIFE—compiled by Elaine Daniels—*Brookhaven Nat'l Lab. (Office of Technical Services)*, 58 p., paper, $1.75. Data taken from the General Electric Chart of the Nuclides, 5th ed.

TEACHING HIGH SCHOOL SCIENCE: A Book of *Methods*—Paul F. Brandwein, Fletcher G. Watson and Paul E. Blackwood—*Harcourt*, 568 p., illus., $6.50. Seeks to help the science teacher in the varied situations in which he may find himself.

TEACHING HIGH SCHOOL SCIENCE: A Sourcebook for the Biological Sciences—Evelyn Morholt, Paul F. Brandwein and Alexander Joseph—*Harcourt*, 506 p., illus., $6.75. Incorporates tested teaching procedures of high school students, of different levels of ability, in general science, biology and health science.

TELEVISION IN SCIENCE AND INDUSTRY—V. K. Zworykin, E. G. Ramberg and L. E. Flory—*Wiley*, 300 p, illus., $10. Explores the function of television as an extension of human sight, variously called closed circuit or industrial television.

WHAT DINOSAUR IS IT?—Anna Pistorius—*Follett*, 29 p., illus., with paintings by the author, $2.25. For young children, contains pronunciation guide.

Science News Letter, July 19, 1958

METEOROLOGY

Science Foundation to Begin Atmospheric Study

➤ THE NATIONAL Science Foundation is going to do something about the weather.

The Foundation revealed that it is establishing a Program for Atmospheric Sciences under the direction of Dr. Earl G. Droessler. The Program is an outgrowth of recommendations by the President's Committee on Weather Control and the Committee on Meteorology of the National Academy of Sciences-National Research Council.

In addition to the "more conventional type of meteorological research," the Program will also be concerned with energy transfer processes between earth, sea and air; turbulent flow of gaseous fluids; heat exchange processes; upper atmosphere studies; atmospheric chemistry; and general circulation problems of the atmosphere and oceans.

Attention will also be given to the field of cloud physics, especially the physics of precipitation, about which the Foundation says, "much basic research must be pursued before the possibilities of controlling or modifying weather can be evaluated."

Dr. Droessler was formerly with the Office of Science, Department of Defense.

Science News Letter, July 19, 1958

ASTRONOMY

Halley's Comet First Recorded by Chinese

➤ CHINESE astronomers spotted Halley's comet in 66 A. D.

This is the first recorded report of the comet, which comes close to the earth every 75 years. The information that Chinese astronomers spotted the comet nearly two millenia ago, and again in 684 and 837 A.D., is contained in a compendium and translation of ancient Chinese astronomical observations by Dr. Hsi Tze-tsung of the Academia Sinica of Peking. The compendium has been published by the Smithsonian Institution, Washington, D.C.

Following the Chinese observations, the next recording was made in Europe in 1305. The recurrent comet was last seen in 1910, at which time, the Institution says, it caused "predictions that its tail might lash to earth, perhaps bring an end to all life."

Science News Letter, July 19, 1958

MEDICINE

Thirsty Mice Drink Themselves to Death

➤ A SPECIAL strain of experimental mice that drink themselves to death has been discovered.

Both sexes of a STR/N strain of mice indulge in heavy water drinking. The females, however, seem to be able to handle their water better than the males who drink themselves to death, research scientists at the National Institute of Arthritis and Metabolic Diseases, Bethesda, Md., have reported.

The thirsty mice were originally obtained for arthritis research but soon became the subjects of a research project in themselves when it was noticed that large quantities of water were disappearing from their cages. Some of the mice were gulping down as much as five times their body weight in water every day.

Within 16 month, 88% of the males developed hydronephrosis, a condition in which the bladder and kidneys become bloated with urine and the animals die.

Pathological studies showed the males developed a mass in the urethra which plugged the flow path of urine. The females did not develop this plug and lived their normal life span, apparently unharmed by their abnormal drinking capacity.

It was also found that the thirsty mice could get along without their water supply. When they received no water except the lesser amount needed for their diet, all of them survived. Thus, it appears that the mice do not have to drink, they just like to over-indulge.

Science News Letter, July 19, 1958

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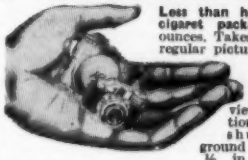

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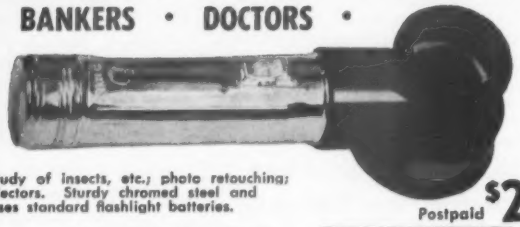

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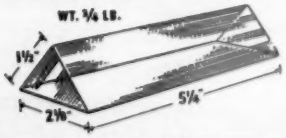

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AGRICULTURE

Cherries Harvested With Fish Net

➤ CHERRY GROWERS may soon be "fishing" for their crop with a minnow net.

Ripe cherries are loosened from the tree with the fingertips and allowed to fall into the net. About 36% more cherries were harvested this way than by the conventional pail-picking method. The fruit is also less likely to spoil or develop scald.

Shaking cherries loose from trees onto a minnow net is an efficient harvesting method. One worker can harvest 100 pounds of cherries in ten minutes.

There may be other variations of this new way of harvesting cherries, the U. S. Department of Agriculture reported.

R. T. Whittenberger and C. H. Hills of the USDA's Eastern utilization division, Philadelphia, experimented with the new methods. More testing needs to be done, however, they point out.

Science News Letter, July 19, 1958

Questions

AGRICULTURE — What common grass was used in the development of a rust-resistant wheat? p. 39.

ASTRONOMY—Who were the first astronomers to record seeing Halley's comet? p. 45.

MEDICINE—What are the advantages of using the new research animal, the steppe-lemming? p. 35.

PHYSICS—How is a proton affected by being bombarded with particles of high energies? p. 36.

What is the purpose in developing a unified field theory? p. 37.

Photographs: Cover, U. S. Department of Agriculture; p. 35, Radio Corporation of America; p. 37, Ann Ewing; p. 39, General Electric Company; p. 47, National Cylinder Gas Division, Chemtron Corporation; p. 48, Playtime Products, Inc.

Do You Know?

The Air Training Command has found a possible solution to the prevention of mid-air collisions by using daylight fluorescent markings on training *planes.*

The growth and metabolism of certain *cells* outside the human body is possible either in test tubes or in polyvinyl sponges implanted in animals.

The north side of Mt. McKinley in Alaska is the second greatest unbroken *precipice* on earth, towering 15,000 feet.

Cytochromes are made up of red, iron-containing proteins, which function as part of the complex food-into-energy cycle.

Fibroblasts are connective tissue cells which form the fibrous tissues in the body and tendons.

The white polar caps of *Mars* almost certainly consist of solidified H_2O.

MEDICINE

Urge Cancer Surgery

Scientists have reported that even short delays in surgery for suspected cancer of the breast, following biopsy, may be followed by recurrence of the disease.

➤ IMMEDIATE surgery for suspected breast cancer patients was urged when biopsy establishes cancerous growth.

The great danger in waiting a few days between biopsy and surgery was called to the attention of the International Cancer Congress meeting in London by Drs. Carlos Sayago and D. Sirenbrenik of Santiago, Chile. (See pp. 35, 36, 38.)

Two experimental groups studied revealed that of 40 operable breast cancer cases that experienced an average delay of 33 days between cancer diagnosis by biopsy and radical mastectomy, only nine cases were clinically free of the disease after a five-year period. Among 40 cases of biopsy followed by immediate surgery, on the other hand, 34 were free of the disease after a five-year period.

In addition, breast cancer patients undergoing surgery should be previously treated with hormones to restore normality to cancer-caused neuro-endocrine imbalance, Drs. Dutu Rosner, J. Lupovici and R. Schreiber of the Oncologic Institute, Bucharest, Rumania, told the Congress.

They also suggested simultaneous therapeutic treatment for hypophysis, thyroid, adrenals and ovary by employing preoperative radiation and hormones.

A combination of nitromin, nitrogen mustard-n-oxide, and prednisolone in the treatment of advanced cancer patients can bring "dramatic" immediate relief of symptoms, Dr. Basil A. Stoll of Melbourne, Australia, reported.

Of 18 cases of breast cancer which spread to the lungs, 13 showed objective control over the disease activity limited to a six-month period. In 53 nonbreast cancers a combination of prednisolone and nitromin yielded no objective benefit although a subjective benefit was noted.

Leukemia in Mouse

➤ AN ANTIBIOTIC that cures a virus-caused leukemia in mice has been perfected.

The virus was discovered three years ago. It causes a form of leukemia that is similar to the spontaneous disease that takes the lives of thousands of humans annually.

The virus-killing antibiotic is Mitomycin C, Drs. Kanematsu Sugiura and C. Chester Stock of the Sloan-Kettering Institute in New York reported at the Cancer Congress. Three nitrogen mustard-like chemicals, TEM, myleran and 1,9-di(methanesulfonoxy)nonane, also inhibited development of the leukemia, they reported.

Formerly, chemical combinations had cured only transplanted animal cancers.

The antibiotic and the chemicals completely inhibited the development of the leukemia in 100% of the animals that had been injected with the virus one day before. They apparently cured 50% of the animals that had been given leukemia seven days before treatment; no leukemic cells were found although slight amounts of virus were still detected in some mice.

Mitomycin C already has been found to be effective in curing 16 different types of transplanted animal cancers. The antibiotic was discovered in Japan and is being tested at the Sloan-Kettering Institute.

To date there is no known cancer in man that has definitely been shown to be virus caused. However, should virus be linked as a causative agent in the future, this new antibiotic may prove helpful in developing a virus-caused cancer antibiotic.

Science News Letter, July 19, 1958

MEDICAL DOLL—A life-like doll used in nurses' training breathes and its visible "lungs" respond as do a human being's when oxygen is administered. The special doll and rescue unit were developed by National Cylinder Gas Division of Chemetron Corporation. Nurses practicing oxygen resuscitation at St. Francis Hospital, Milwaukee, Wis., are Mary Hamm, Loretta Lillie and Mary Lukomski.

ENTOMOLOGY

Discover More Wasps That Lay Eggs in Live Host

➤ BABY WASPS that hatch in a safe, warm world where there is always lots of food, inside the body of another insect, are described in a new bulletin published by the Smithsonian Institution.

Two new genera and approximately 30 new species of these wasps, members of the family Braconidae, found chiefly in subtropical America, are reported by C. F. W. Muesebeck, an honorary collaborator of the Institution.

The female deposits her eggs inside the host insect, usually a caterpillar, by means of an organ called the "ovipositor" which penetrates the host's skin. By some strange provision of nature, Mr. Muesebeck explains, the larva never feeds on, or injures in any way, any of its host's vital organs.

The larvae instinctively eat only fats and body fluids that are nonessential to life. The host may outwardly look healthy.

However, as soon as the larva changes into an adult, the four-winged wasp breaks through the insect's body walls, usually killing it. This period of metamorphosis usually takes about two to three weeks.

Sometimes if the host insect is dormant, as in the winter time, the larva also remains dormant. Development is at a standstill until the host becomes active again.

Science News Letter, July 19, 1958

New chemical *glues* with remarkable powers of adhesion may some day antiquate today's nails and rivets.

New Machines and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 944. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

WOOD-CUTTING UNIT can be used in all forms of woodworking and pattern-making. The unit has three high-speed steel cutters that eliminate any "grab" or "kick-back." It will operate at 5,000 revolutions per minute or slower speeds, and can be used in any drill press with a one-half inch capacity chuck.

Science News Letter, July 19, 1958

GLASS VALET holds eyeglasses when owner is showering, shaving, working or sleeping. The stand is made of plastic and can be put on a desk, table or dresser, or mounted on a wall. It is available in three colors and stands two and one-half inches high.

Science News Letter, July 19, 1958

SWEATER HANGER is designed to hold a sweater, baby's clothes or hosiery flat and out of the way on the clothes line. The swing is lightweight and made of a fabric. The hanger, which folds for storage, can also be used indoors on a shower rod or against a wall on a hook.

Science News Letter, July 19, 1958

SPACE HORSE for junior is a variation on a theme. It substitutes a gear shift that moves, a horn that beeps and a wheel that steers, for the static stick horse's head.

The toy, shown in the photograph, has an eight-inch adjustment in length to suit children from three to nine. The rear wheels click, too.

Science News Letter, July 19, 1958

GOLF RACK holds nine clubs in rubber-lined openings. Made of aluminum and weighing only three pounds, the rack is open on all sides. It is pushed into the ground to stand on three spikes. Space is provided for balls, tees and a pencil; cigarette and lighter holders are optional.

Science News Letter, July 19, 1958

POCKET RECORD-PLAYER can handle a normal 12-inch long-playing record. A British development, the miniature player does away with the turntable and provides a drive at the center of the record, a pick-up, a transistorized amplifier and a speaker sandwiched into a four-by-eight-inch package. It is battery-driven.

Science News Letter, July 19, 1958

DUAL-KEYBOARD TYPEWRITER is designed for scientific and mathematical formulae typing. The two keyboards of this British machine have a total of 180 characters. They are synchronized so that the scientific symbols on one fall accurately into place on the script typed by the other.

Science News Letter, July 19, 1958

PORTABLE SEAT, that fits into a golf bag, can support a 350-pound man. The three-legged rest, weighing two pounds, has a canvas seat. When folded, its overall length is 23 inches; when set up, it is 21 inches off the ground. The seat is also useful for picnics, parades, or fishing.

Science News Letter, July 19, 1958

Nature Ramblings

By HORACE LOFTIN

➤ WHAT IS a "species" of plants or animals?

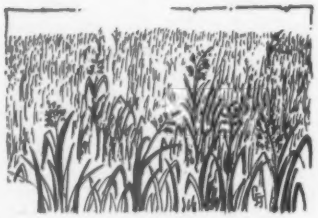
To many people, including many scientists, a species, phrased in simple terms, is a group of similar-appearing creatures that can interbreed to produce fertile offspring but which does not cross with other groups to yield fertile hybrids.

Actually, such a hard and fast definition does not hold true. Too many well-established "species" are known to cross with other species for this rule to be generally used. A striking example of genuine species breeding with other unlike species to produce strong and fertile hybrids can be seen in the wheat plants.

Through a series of investigations and deductions worthy of a Sherlock Holmes, plant scientists have unraveled much of the history of the origin of our wheat plants.

Among the earliest traces of man's primitive agriculture are charred bits of wheat of a species found even today both as a wild and as a domestic plant. This wheat

Nature's Net



of primitive man, called einkorn, is itself primitive in its characteristics.

Then among later sites, for example ruins of classical Greek times, another kind of wheat is found, called emmer. For man's purposes as food it is a step above einkorn. Many qualities set it apart from the primitive wheat. Modern spaghetti wheat is closely related to this emmer.

Then another kind of wheat appears, the group that includes our present-day bread wheats, with features distinct from the einkorn and emmer types.

By a study of the cell structure of these different wheats, scientists were able to piece together their story.

First, the ancient einkorn crossed with an unknown species of wild grass to give rise to the emmer-type wheat. This new wheat was, in turn, crossed with another unrelated species of wild grass to produce our modern bread-type wheats.

A bread wheat has actually been made experimentally by crossing emmer with a well-known wild grass, *Aegilops squarrosa*, found in the areas where our modern wheat is thought to have originated. As a test, this man-made hybrid was bred with a naturally occurring bread wheat. The cross produced offspring in all visible respects like the natural bread wheat.

When species as unlike as well-known wheats and wild grasses can cross to produce "new" species, our old definitions vanish. What, then, are species? They have been likened to the knots in a net whose web represents the continuous connection between all living things. In the study of nature, it is the whole net of life that is important, not the knots.

Science News Letter, July 19, 1958